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NEWS FROM THE MADRAS CROCODILE BANK

The oldest female gharial at the Croc Bank gave us a pleasant Easter Sunday surprize: she nested. Unfortunately the 11 eggs were premature and unformed, but we were able to watch her activity at close quarters. At about the same time the female saltwater croc began building her own nest and the spectacled Caiman not to be left out quickly got to work and laid one clutch of eggs. The mugger, over-doing it as usual, have 32 nests so far.

International crocs expected to arrive in the near future are: Alligators from Ted Joanen at Rockefeller Refuge, Siamese crocs from Metro Zoo, Miami and Morelett's crocs from Howard Hunt in Atlanta Zoo.

Thilo Westhausen from Macalaster College, Minnesota is at the Croc Bank for two months helping with outdoor and indoor work. He has been assisting Harry with this year's nesting program; in a croc farm where females lay two nests instead of the usual single one, the breeding season is a time of frantic activity by man and beast. Thilo is also doing a long overdue cataloging job on our reprint library. In between, he catches ghost crabs on the beach and boils them up for soup, a highly nutritious if slightly sandy concoction.

Dr. Jack Frazier of the National Zoo in Washington is on his way to India on a nine month study of sea turtle natural history and conservation. For at least part of this period his base will be the Crocodile Bank just outside of which the Ridleys nests from November to March. Talking of sea turtles, Satish Bhaskar is back from his 1½-year project in Irian Jaya, Indonesia, and is now writing his report for WWF at the Croc Bank.

The Harvard Museum of Comparative Zoology tour spent a day at the Croc Bank and the Irula Co-operative. Richard and Maisie Fitter of the Fauna and Flora Preservation Society were able to spend some time here as well, as always to our great advantage

Daniel Pelligrini of the recently begun Italian nature magazine Aqua, is photographing the Bank for a forthcoming feature on crocodiles.

PRELIMINARY REPORT ON MUGGER BREEDING AT MCBT FOR 1986

This year 'Amara', one of the Bank's oldest females, nested on Feb 1st laying 29 eggs, marking the beginning of the nesting season here. This is the earliest nest in the past 10 years of breeding. Also interesting is the fact that Amara nested much earlier than she has for the past 5 years, also, she double-clutched this year for the first time.

The Bank already has 32 nests this season, with a total of 740 eggs of which 213 were found infertile after each clutch was candled before incubation. The second phase of the season (double-clutching) has started. Seven females have double-clutched and of these, 5 young females nested, and double-clutched for the first time.

Table 1 Double clutching by first-year layers: C. palustris

Year Hatched	Total length & weight as on 15/5/86		Number of Eggs 1st Clutch	Number of Eggs 2nd Clutch	Number of Infertile Eggs 1st Clutch	Number of Infertile Eggs 2nd Clutch	Inter Nesting Interval
1977 MCBT	181cms	29kgs	27	19	0	4	38 days
1977 MCBT	203cms	36 kgs	15	12	10	10	28 days
1978 MCBT	195cms	34 kgs	27	16	6	6	48 days
1979 MCBT	185cms	36 kgs	24	20	7	3	34 days

This feature now indicates clearly that double-clutching nesting in a single season is typical not only of the particular group of females in breeding enclosure No.8 that double-clutched for the past 7 years, but also of younger, F-2 females bred and reared here at the Bank. The second clutches have less eggs and the eggs are smaller than that of the first clutch. Another interesting feature that has begun to emerge this year is that of the 12 females in the age group of 7-9 years nested for the first time; 8 females laid 40-100% fertile eggs and 4 females laid 100% infertile eggs. In alligators it is reported that captive reared animals lay inferior eggs, compared to wild ones. Low egg production, low percentages of fertility and hatching are standard features, though captive alligators may grow larger, and faster and start laying very early compared to the wild ones. These features may be established here for the mugger.

Since the Bank has entered into the second phase of the nesting season it is estimated that at least 10 more nests and perhaps 250 more eggs will be laid this year in our 3 mugger breeding enclosures.

Harry Andrews
Curator
MCBT

BASANTI OWES A RESPONSIBILITY TO HER RACE

The Gharial Research and Conservation Unit at Tikarpara (Satkosia Gorge in Mahanadi River - Orissa) has four adult mugger (*Crocodylus palustris*) in one of the pools, in addition to gharial (*Gavialis gangeticus*). Both mugger and gharial once inhabited the river, with a comparatively large concentration in the Satkosia Groge. Only a few wild mugger and gharial were left in the Gorge when this population was supplemented by young from the Conservation Project.

On 31.1.1979 a wild adult female mugger smelt her way to a captive male housed in the Project pool, and broke through the wire-mesh fence at a weak point. We named this wild crocodile Basanti as she had traced her way guided by the smell ('basana' in Oriya) of the male. That day we noticed the pair mating, but there was no laying of eggs that year. Though she stayed in the pool during the 1980 breeding season and mated with the male, Basanti did not lay eggs that season also. She escaped from the pool into the river on 4.8.1980 in the same way as she had come, by breaking through the wire mesh.

On 16.3.1981 she again broke into the enclosure in the same manner and stayed until 31.8.1982, when she escaped again. During this stay which covered two breeding seasons she laid twelve eggs in 1981 and fourteen eggs in 1982 resulting in 17 hatchlings (5 - 1981, 12 - 1982). On 23.2.1983 she again came back to her male and laid 20 eggs, all of which hatched. This time she remained in the pool for three breeding seasons (1983, 1984 and 1985), and laid fertile eggs in eacy year. She has again escaped on 16.10.1985.

Mugger generally start mating a month or more before the eggs are laid. Eggs are laid in March and April and hatchlings appear after about 50 to 60 days. Invariably Basanti has come to the pool in search of her mate immediately before the breeding season and has tried to escape to freedom after she has successfully attended to her responsibilities. The remarkable feature of her escape and entrance game is that she has never skipped a single breeding season and has sacrificed her freedom for breeding in the enclosure. In 1979, 1981, 1983 and 1984 the wild female had not been able to escape, not being able to locate a weak point in the enclosure. The details of her entry and her escape and the season-wise laying of eggs corroborate my observations:

First Entrance	31.1.1979	First escape	4.8.1980
Second Entrance	16.3.1981	Second escape	31.8.1982
Third Entrance	23.2.1983	Third escape	16.10.1985

Season	Eggs laid	Date of hatching	No of hatchlings
1981	12	15.5.1982	5
1982	14	11.5.1983	12
1983	20	19.5.1984	20
1984	18	19.5.1984	15
1985	15	9.5.1985	12

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S N A K E B I T E

In 1977 the Snake Park collaborated with the Indian Pharmacological Society, Orient Pharma and the Madras Medical College on an all-India symposium, "The Diagnosis and Treatment of Snakebites in India". Though the various papers were cyclostyled and distributed to participants the information was not used elsewhere except as recommendations to the State and Central Governments. Hamadryad will publish one or more of these papers in forth-coming issues for your interest beginning with the following introductory paper.

THE SNAKES RESPONSIBLE & THEIR NATURAL HISTORY

The Snakes

There are 236 species of snakes in India and its coastal waters. Of these 55 are venomous:

20 Sea Snakes	3 Vipers
16 Pit Vipers	3 Cobra sub-species
7 Kraits	1 King Cobra
5 Coral Snakes	

Most of these snakes are rarely encountered by man; the sea snakes are restricted to the oceans, the pit vipers, coral snakes and king cobra to inhospitable rain forests; all but two of the kraits are rare. The four common dangerous snakes of India (the Big Four) are the cobra (with 3 sub-species), the common krait, saw-scaled viper and Russell's viper. These are the medically important species, the ones which are commonly encountered in most parts of the country, responsible for serious bites and those for which the Haffkine and Serum Institute of India polyvalent antivenom serum is effective.

Cobras are found wherever rice growsand rats are plentiful. The krait is not so widely distributed and favours drier parts of the country. The saw-scaled viper likewise prefers drier open habitat and russells vipers are fond of low hills, dense thickets in both dry and wet parts of the country. Most large snakes are rodent eaters and the cobra, krait and russells viper are no exceptions- the saw-scaled viper also eats mice but preys mostly on smaller creatures such as lizards, frogs, and scorpions.

No snake can be called "aggressive", but most will readily defend themselves by biting if stepped upon or molested. The seriousness of the bite depends mostly on the quantity of venom injected. Fortunately in a quick defensive bite the quantity is more often sublethal. The possible exception is krait bite; the venom is so toxic that even a fraction of a drop may prove fatal.

In Tamil Nadu (and other localities) the saw-scaled viper is by far the most common venomous snake and is found throughout the dry open plains. It is responsible for most venomous bites but fatalities are very rare due to the small size of the southern race of this snake. Bites usually happen as people walk at night without a light. The saw-scaled viper is fond of lying on open roads and paths after dark. Its characteristic "hiss" is made by rubbing its saw-edged scales together.

The krait is common in some areas of the state, particularly sandy areas. Being strictly nocturnal bites happen when the snake is stepped on or accidentally molested when it crawls near a sleeping person. The krait is a very shy, retiring species.

The Russells viper is common in low hills with abundant cactus, thorn bushes, thick grass and rocks. It hisses loudly when aroused and if not allowed to escape will strike violently. Bites generally occur when an unwary field or forest worker steps upon or touches one by accident.

The cobra is next in abundance to the saw-scaled viper and is the single most widely distributed Indian venomous snake. Cobras have large clutches of eggs which they protect till they hatch thus giving an optimum survival rate for the species. They live quite comfortably (out of sight) in close proximity to man. Bites occur in dense cover when the snake is accidentally molested by field workers or stepped upon. The cobra's classic defence of hissing and hood spreading makes it easy to recognize.

Statistical evidence demonstrates that 2-5 hours is the time period most lethal cobra and krait bites manifest the serious paralytic symptoms preceding terminal symptoms of suffocation and/or heart failure. Cobra bite is typically painful with swelling; krait bite causes very little pain and no swelling. This creates another problem: a patient in the grips of the frightening burning pain of viper or cobra bite demands and gets treatment to ease his misery. The krait bite victim feels no pain, does not complain and for several hours may appear quite normal. Since most krait bites are at night the patient under observation is generally sleepy if and when the neurotoxic symptoms begin. The initial paralytic symptoms (ptosis, slurred speech, head droop and drowsiness) may be passed of as sleepiness and more time lost. If all this happens in hospital the chances are the symptoms will be diagnosed and IV antivenom started in time. However in the village it is very likely that the near terminal alarming symptoms of severe abdominal pain will set in before antivenom is finally reached.

Bites of the Russells viper and saw-scaled viper may manifest serious symptoms (swelling and pain) within two hours but obvious systemic symptoms may take 6-12 hours to set in (blood in sputum or urine, weakness and later uremia).

Snakebite Treatment

The Irulas, the expert snake catching tribals living in the Madras area are some of the few people to whom snake-bite is a distinct occupational hazard. We know of 8 Irulas, both men and women, who have lost their lives to snake bite in the past four years, during collection for the venom labs and snakeskin industry. The Irulas have evolved complex herbal treatments for snakebite which seem partly effective for the initial (dangerous) stages of snakebite and quite valuable in treating after effects such as residual swelling.

Because of the basic fact that the majority of snake bites are sub-lethal the quacks are very popular with various purported remedies from mantras (chanting) and "snake stones" to patent medicines and inhalants. The public is ever gullible, antivenom is still not well known and the quack's reputation grows with his supposed "success"

Standard first-aid and medical treatment of snakebite must be available at the village primary health centre level. The main form of transport in India is the bullock cart; if the trip is 4 to 5 hours to the nearest hospital the patient is in trouble. The four factors responsible for the startling fact that about 90% of snakebites go without medical treatment are: a) the public is generally not aware of the existence of antivenom serum b) the distribution of antivenom is insufficient at the rural level c) there is no public condifence in allopathy (antivenom therapy) in snakebite treatment d) quack remedies, mantras etc. have captured the confidence and "market" for snakebite treatment by tradition as well as dramatized "successful treatments". In pre-antivenom days the poor snakebite victim had to rely on the local "expert". Now the situation is not nearly so desperate; if patients routinely came for urgent antivenom treatment there would be little mortality and this would be the impetus to step up antivenom production at more centres.

Some states make it mandatory that all government medical facilities including Primary Health Centres stock antivenom serum.

Besides the dearth of antivenom supply and publicity we suffer from the medical staffs' lack of acquaintance with antivenom and experience with actual snakebite treatment. Complicating the problem are the variety of treatments recommended by medical texts.

The most searching snakebite question asked by the public is: What do we do if we live far away from town and one of us gets bitten? Often their circumstances include an individual with some paramedical experience who could be acquainted with the use of antivenom. Failing that, (if the people are of typical, unsophisticated farmer class) what do you recommend? Should we now say he may as well try one of the many village remedies or resort to the dangerous cut and suction method?

First-Aid in the Field

The time gap between the bite and onset of serious symptoms is dependent on many factors including site of bite, quantity of venom and activity of the patient immediately following the bite. Occasionally the fang penctrates a vein or venom is injected into important lymphatics speeding up the serious symptoms. The immediate first-aid measure to be stressed is the proper application of a tourniquet: on the upper leg or upper arm of one finger looseness and half hourly brief removal. The

second most important first aid measure in the field is reassuring the victim and treating for shock. Besides standard shock treatment, a placebo, in the form of a harmless injection (a mantra or charm can have a positive psychological effect) will help considerably to relieve the patient's anxiety and associated complications of shock. The third "first aid measure" is the urgent transport of the patient to medical (antivenom) treatment, k keeping in mind the sometimes critical time factor.

Medical Treatment

When a patient arrives at a village dispensary or primary health centre the doctor may be away on an urgent house call, living in another village (at night) or present for only a few hours a day. This makes it most important for nurse, compounder, and other staff to be familiar with antivenom use. One complicating factor is antivenom (horse serum) allergy. Roughly 30% of people show some sensitivity to horse serum, a small fraction of these are hyper senstitive and might go into anaphylactic shock within a minute after an undiluted antivenom injection. Fortunately there are few such hyper-sensitive people. Since the danger exists though, skin tests and use of adrenalin and antihistamines are important parts of snakebite treatment.

When the patient arrives at the hospital he must usually go through the formalities of registering and being examined, assigned a bed etc. Minutes are wasted which may have a critical bearing on the patients' survival if it is a serious bite. Since there is no way of gauging the amount of venom injected and since the snake responsible is rarely identified (6% in all India hospital figures) each snakebite patient should be treated with the attention and urgency of a patient in the operating theatre; there is the same possibility of his becoming critical in minutes.

If antivenom is given through an IV glucose or saline infusion it can quickly neutralize the venom and can be immediately shut off in case of a reaction. Other supporting drugs can be easily introduced. When sufficient antivenom is injected it is gratifying to see the immediate reversal of neurotoxic symptoms in cases of cobra and krait bites. This is also true in cases of viper bites when treated early. However once the enzyme and toxin action of viper venom has advanced the neutralization of the venoms cannot help the destruction already caused. The bleeding tendency, local tissue damage and blockage of lymphatics resulting in massive (sometimes permanent) swelling must be treated with strong supportive therapy including coagulant aids, transfusions of platelet rich whole blood etc.

After Effects

Complications such as necrosis are common in cobra and Russells viper bites but may not become obvious for a week or more after the patient has completely recovered from systemic symptoms. Meanwhile the patient has generally been discharged with a dressing that stays on (incubating the necrosis) often for days. The resultant complications may lead to motor disability and require plastic surgery and other drastic measures. Advanced necrosis often leads to amputation. Daily post-discharge check-up and dressing change should be mandatory for at least a week.

Summary and Conclusion

The four dangerous snakes with an almost nation-wide distribution are the cobra, krait, Russells viper and saw-scaled viper. Haffkine and Serum Insitiute of India polyvalent antivenom is effective for these four. The other venomous snakes (pit vipers, King cobra, banded krait and sea snakes) are either too rare, with sub-lethal venoms or disinclined to bite and are of minimal medical importance in India. Bites usually happen to farm and field labourers in evening hours, and on the lower leg. Bites among snake catchers like the Irulas are common; they have their own herbal "remedies" and usually disdain allopathic (antivenom) therapy. Other purported "remedies" include mantra, patent medicines, snake stones and charms. Their use may be of some psychological value but should never come in the way of seeking urgent antivenom treatment.

Some of the main problems contributing to the high mortality from snakebite in India are a) lack of attention to preventive measures (keeping house and land free of rats and debris for snakes to hide in b) insufficient antivenom distribution c) insufficient antivenom publicity d) inadequate training of medical personnel in snakebite emergency e) time factor and distances involved in rural conditions f) supersititious fear, reliance on traditional "remedies" and lack of confidence/or knowledge of antivenom treatment. in/ Usually several hours elapse before a lethal bite becomes critical. During this period, if no time is wasted, the patient can usually reach a course of antivenom. The 3 basic field first-aid measures are: a) tourniquet on single bone above bite b) reassurance and treatment for shock (including placebo) c) transport to antivenom treatment.

The village doctor is often not available Paramedics should be trained in antivenom use and the associated complications of horse serum allergy. Hospital formalities often delay a snakebite victim for critical minutes. Contradictory or inadequate instructions in medical manuals and antivenom pamphlets create some confusion in hospital treatment. After effects such as necrosis are often not given sufficient attention resulting in unnecessarily severe complications.

Some of the suggested improvements toward reducing the fatalities and fear of high mortality from snake bite are:

a) Production of antivenom at other centres.

b) Production of mono and bivalent antivenoms.

c) Distribution of antivenom to all rural Primary Health Centres and training to paramedics.

d) Wide publicity for antivenom and first-aid measures.

e) Public education concerning snakes and their natural history emphasizing the role of snakes in agro-ecology as rodent predators and the relatively few which are dangerous to man.

f) Studying local problems and standardizing of snakebite treatment.

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NON VENOMOUS SNAKEBITE IN WEST BENGAL

During 1967 to 1984 802 persons bitten by snakes were treated at the Harendranagar Health Centre and Raidighi Rural Hospital in the Distirct of 24- Parganas, West Bengal; 685 of these persons were bitten by non-poisonous snakes without developing any morbidity. One person bitten by Trimeresurus erythrurus (see Hamadryad 8 NO.3, Sept. 1983) and 117 persons bitten by poisonous snakes which developed symptoms of envenomation.

The following table shows the species of non-poisonous snakes responsible for the 685 bites:

Species of Snake	No. of cases	Percentage
1) Natrix piscator (Checkered keel-back water snake	282	41.2
2) Lycodon aulicus (Common wolf snake)	132	19.3
3) Ptyas mucosus (Rat snake)	22	3.3
4) Tree Snakes		
i) Dendrelaphis sp. (Bronze back tree snake)	8	1.2
ii) Ahaetulla nasutus (Vine snake)	1	0.2
5) Typhlops braminus (Common blind snake)	1	0.2
6) Cerberus rhynchops (Dog-faced water snake)	64	9.4
7) Snake seen but not identified and unknown bites	174	25.4
T o t a l	685	

The high percentage of water snake bites in the above table is due to abundant paddy fields and numerous ponds in the area. The percentage of bites by the dog-faced water snake is also significant because of the brackish water, tidal rivers and mangrove forests of the area. Bites generally happen by these two species during rice cultivation and fishing. High incidence of wolf snake bites is because this is a typically house dwelling species.

References:

1. Saha, S.G. and Hati, A.K. (1983) "A longitudinal Study on Snakebites in a Subsidiary Health Centre in West Bengal", Snake, 15(2) pp.86-89.

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HANDBOOK OF SNAKEBITE by Paresh Banerji

Why review a book published in 1929? Partly because it is a classic in its own right and partly because the publishers (International Books and Periodicals Supply Service) have, incredibly, seen fit to reprint it.

In the 1920's antivenom serum was already being produced at the Pasteur Institute, Kasauli (Himachal Pradesh) and at Haffkine Institute Bombay but it was as yet unknown to rural India. The list of snakebite "remedies" is as long as they are imaginative but few remedies have had such a spokesman. Paresh Banerji was an employee of the Eastern Indian Railways at Mihijam in Bengal. We know nothing more about him except what can be gleaned from going through the book-- a strange, unpredictable ramble through fact and fancy.

The main purpose of the book is to talk about his patent cure for snakebite "Lexin", based on a formula published by Mr. B in 1922 in his book "Therapeutics of Snake-Poisonings" (which we have yet to see). But I think Mr. B should be permitted to tell you his own story through the following excerpts.

Preface

"The following pages deal with the history of medicine invented by the writer, and believed by him to be the real specific for snake poisoning. It is used as an inhalation and designed to neutralize the venom circulated in the bloodstream or obsorbed in the system of man, the salt-eating animal.

"Experiments have been made on laboratory animals, dogs and guinea-pigs, injected with snake venom, but they all died as they could not be made to inhale the drug properly. But when tried on human victims of snake poisonings, it has given admirable results.

"This book is not for those toy-scientists who will never try to save man unless recommended to do so by guinea-pigs and monkeys. The writer has discovered bacteria in varieties of snake venom and believes that it is their toxin that kills. The presence of bacteria has made the production of Calmette's antitoxin possible... "Lexin", when inhaled, charges the blood with molecules of its ingredients (gold chloride, alcohol, camphor, hydrochloric acid, pyoktanin) and kills the germs floating in the blood and also chemically neutralizes the venom in the blood, coming directly in contact with the protein of the poison.

Lexin has practically answered the needs of the dying man, and has built up for itself a grand record of success by saving six thousand souls".

Chapter 1 is about "Lexin" with 14 pages of scientific and some not so scientific explanations of why it is so effective. But even Mr.Banerji admits that "the dynamic force of "Lexin" may remain a mystery to the human brain for some time to come.

Chapter 2 "The leading snakes of India" discusses such stars in the "galaxy of killers" as the python who "is competent to kill anybody by coiling round and round the victim till it is smashed into an unrecognizable mass". The king cobra is given due credit, it "cannot tolerate the presence of any living (or moving) thing within his ken. He would chase any passerby be it a man or a horse. Simply biting will not exhaust his temper, he would tear the victim to pieces". Later, in the delightful chapter XI the author writes "it is said that once a king cobra (12 feet) captured a cow and broke the bones of her legs by squeezing round and round with its coils. A King Cobra can pick up a lamb by its mouth and carry it home without apparent exertion". Elsewhere he admits that king cobras live mainly on snakes.

Discussing the cobra the author notes that most bites occur when the moon is in Aries (on the Bengali almanac) and that "the moon regulates the ebb and flow of the venom in the glands".

The Russells viper is a friendly sort! "should you meet him on the road, he would rather wait for you (perhaps to teach you an unpleasant lesson) than flee away from the sight of man".

The krait he rightly reports as having the most virulent venom of Indian land snakes. Though it looks like a "good boy", it is found all over India "destroying human life right and left".

Things get a bit confusing with the coral snake being described as a pit viper and some vague descriptions of American and European snakes.

Chapter 3 is devoted to the vernacular names of the important venomous snakes and includes a worm snake Typhlops diardi! There are several more colour plates by S. Das including a classic showing a king cobra carrying a white lamb.

Chapter 4, 5 and 6 talk about fangs, venom glands, snake bite symptoms and diagnosis. Among other unique observations the symptoms of Typhlops (the harmless worm snake) "poisoning" deserve attention: "terrible burning sensation and agonizing pain all over the body. Elevated reddish spots like urticaria all over the body".

Chapter 7 is about common errors in treating snakebite (rightly describing potassium permanganate, excision etc as useless) and Chapter 8 is on "Medical jurisprudence" Here Banerji gets into a field he obviously likes and has done a lot of reading on. He particularly dwells on the cases of women coming out of the coma-like state in

neurotoxic envenomation feeling as if they had their "modesty violated".

Chapter 9 is on the pharmacology of snake venom and gets into Calmette's success in producing antivenom but highlights its disadvantages, namely the specificity of antivenom and the need to use large quantities (i.e. up to 400 cc for one cobra bite). The author also lists various homeopathic preparations made from snake venoms.

Chapter 10 is on snake distribution and is taken mainly from Boulenger (1890).

Chapter 11 "All about snakes" has to be read completely to fully appreciate it. A few gems must be given here though:

> "As the ear is absent, snakes hear with their eyes"
>
> "The flying snakes of Arabia have got wings"
>
> "Snake men can play with a cobra only, because these snakes are in the habit of paying close attention to a course of melodious music; and when they hear, they do not see, as I have said above.
>
> "A viper does not care a straw for your music though it can hear well".

In the last few pages of his text Banerji starts showing some political colours. In the section "Snake worship" he makes the point that we deify killers like Alexander, Ceasar and Hannibal. Then he says "In the last Great War, Lloyd George of England, Wilhelm of Germany, Gandhi of India and a few others killed only about 30 million of our brothers (in both parties) at a cost of about 60 thousand million pounds. That is, we had to pay, on an average, 20,000 pounds for a single head of man! They ceased killing just when we could not make further payments! But the snakes are killing right and left, without arms or ammunitions nay, without limbs even, and do not claim a small penny from us as cost. My gentle reader, if you have never worshipped the snake do it now; the snake has good grounds to claim our admiration".

Then follows over 300 pages of brief snakebite case history re orts, 1134 of them and all treated with "Lexin". Ten of the cases are allegedly Typhlops bites with various interesting symptoms. Since no one has done any serious study on "Lexin" there is not much one can conclude except that an inhalant (plain ammonia is good) could be a good placebo and helpful in shock following snakebite, especially when antivenom is not immediately available. The trouble with recommending things like this at a rural level is that they are apt to used instead of antivenom.

But one of the highlights of the book is the last page of text, entitled:

Non-poisonous snakes

"As the Non-Poisonous S akes have found no place in the body of this book, they must be honoured at the end. They have got no poison glands, but still they are not always harmless. Just as rats and dogs have no poison glands but sometimes harbour certain toxin in their saliva. Fatalities are on record from rat-bite fever and rabies as also from bites of non-venomous snakes. These are facts known to everybody. I should like to plead on behalf of the non-venomous snakes. Their bites sometimes prove fatal. Discarding the element of fright involved in the appearance of snakes, fatal results may follow the bite of non-venomous one. Let me explain: Snakes are often seen infested with ticks as are found in the body of dogs and birds. When venomous and non-venomous snake come to each other very closely, the ticks interchange their abode. Ticks from a venomous snake come to live in the body of a non-venomous one and infect the latter, and after a certain length of time the saliva of the snake becomes toxic on account of the presence of the new arrivals. Dhamins (rat-snakes) have been seen to produce fatal results sometimes. So we should not totally disregard the non-venomous sn kes as "good for nothing" All honour to the Killers of Men!"

R. Whitaker
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OBSERVATIONS ON THE NESTING OF TWO SOFT-SHELL TURTLES, CHAMBAL RIVER, UTTAR PARDESH

1. Introduction

The Lissemys species are small soft-shell turtles found in pondsand rivers of India. They lay eggs in mud and sand banks in the rainy season (August and September) in Uttar Pradesh.

Observations on turtle nesting in the Chambal area were made by Dr. E.O. Moll (Fresh water Chelonian Specialist Group), Crocodile Bank Research Associate Ms. J. Vijaya and Satish Bhaskar with the author in 1983. The author made the first fresh water turtle hatchery in 1983 in his room. A hatchery was also maintained by the author in 1984 and 1985.

On 16th December, 1985 a nest of seven eggs of Lissemys punctata was observed near the Chambal. As studies on eggs of Lissemys are insufficient in the literature the author shall discuss findings including predation.

2. Observations on Nest and Eggs of Soft-shell Turtles and their Predation

Lissemys punctata nest details: Depth of nest 23 cm Depth of egg from surface 19 cm. Distance of nest from water 220 cm. Total number of eggs found in nest 7. Temperature of nest 24 C. Mean diameter of eggs (N = 7) 2.73 cm. Mean weight of egg 11 gms. Both Trionyx and Lissemys mostly lay eggs in the muddy soil observed along the Chambal river. Nests of Trionyx are generally farther from the river edge than Lissemys nests. After egg laying the females of both genera cover the nest with muddy and grassy soil. Depth and width of Trionyx nests in the Chambal area were found to be more in comparison to Lissemys nests observed in the wild and in the author's courtyard. The author observed predated nests of Trionyx sp. (confirmed from tracks of feet and tail) with 19 and 30 empty eggshells in September 1985. The distance of one Trionyx nest from the river was 198 metres and the height of the nest 13.5 metres from the river's surface. The distance of the second Trionyx nest from the river was 80 metres and the height of the nest from the surface was 13 metres. Both the nestswere at the edge of a water channel in the shadow of a tree. Jackal footprints were observed in the predated nests and it was observed that jackals dig in the nesting area repeatedly before finding the eggs. Later the author observed pieces of turtle shell in the feces of jackals near the turtle nesting bank.

Conclusion

Lissemys and Trionyx lay eggs in the same type of soil and eggs of both the genera are preyed upon by jackals.

Suggestions

Protection of fresh-water turtle eggs are important for the development of the country. This will help in pollution control in different rivers of India, to check the extinction of endangered species of turtles, development of studies on turtles and their eggs, the turtle industry and help to maintain/ecological balance /an in rivers and in ponds.

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Note: S.B. Mishra is a Research Assistant working at the Crocodile Rehabilitation Centre Kukrail (Lucknow), U.P. At present he is maintaining 33 hardshell turtle hatchlings and has two pools for studying feed, growth and morphology. Mr. Mishra would like to correspond with others working on turtle breeding.

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ROCKETS AT THE GAHIRMATHA ROOKERY?

Protests by the inhabitants of Baliapal, in Balasore district, Orissa, over the setting up of the national rocket testing range have caused the site to be abandoned. The proposal to shift the range to Satbhaya, in the Kendrapara subdivision of Cuttack district, in the same state, however, is to be viewed with concern by conservationists, as it lies within the 70 sq.km. Bhitar Kanika Wildlife Sanctuary.

Gazetted in 1975 for the endangered saltwater crocodile, Bhitar Kanika is one of the few mangrove forests left on the eastern coast of India. Satbhaya is situated on the 35 km. Gahirmatha beach, which forms the eastern boundary of the sanctuary, and is perhaps the biggest and one of the world's most important olive ridley rookeries where an estimated 800,000 turtles nested in the 1984 season.

Location of the rocket testing range in Bhitar Kanika, or it's vicinity would spell disaster to the unique and fragile mangrove and marine ecosystems and ecologists and environmental crusaders will, no doubt, fight against so myopic a move.

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TEST RANGE FOR BALASORE CLEARED

(Indian Express, 22/5/86)

New Delhi, May 21 (PTI) The Government has finally cleared the plan for establishing an instrumented test range in Balasore district of Orissa as national facility for testing space launch vehicles and rockets and missiles for the defence services.

Following objections raised by politicians and the people of the area, land requirements of the project have been reduced from 115 to 68 sq. km for the range itself and from 45 to 34 sq. km. for the safety zone.

As a result, the number of affected families stand reduced from a out of 11,600 to 6,100 families. Cultivation and fishing will be allowed in the safety zone when there is no test firing.

According to Dr. V.S. Arunachalam, scientific adviser to the Defence Minister, the range will become fully operational by about 1990. An interim test range facility has already been set up in the area.

The range will meet a long felt need to develop and improve indigenously produced missiles and space vehicles and reduce India's dependence on other countries.

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CHECKLIST AND DISTRIBUTION OF THE LIZARD FAUNA OF PAKISTAN

Recently, since the works of Minton (1966) and Mertens (1969) Khan (1977, 1980) three new species of geckos were added to the fauna of Pakistan, by Minton et.al., (1970) Khan (1980)b) and Szczerback and Golubev (1981). The following is an up to date checklist of the lizard fauna of Palistan and their distribution.

Taxon	Baluchistan	Sindh	Punjab	N.W.F.P
Gekkonidae				
Agamura agamuroides	+	-	-	-
A. femoralis	+	-	-	-
A. persica	+	+	-	+
Alsophylax tuberculatus	+	+	-	-
Eublepharis macularius	+	+	+	+
Cyrtodactylus chitralensis	-	-	-	
C. dattanensis	-	-	-	-
C. fedtschenkoi	+	-	-	-
C.k. kachhensis	+	-	-	-
C.k. watsoni	+	-	-	+
C. mintoni	-	-	-	+
C. montiumsalsorum	-	-	+	-
C. scaber	+	+	+	-
C. stoliczkai	-	-	-	+
Hemidactylus b. brooki	+	+	+	+
H. flaviviridis	+	+	+	+
H. leschenaultii	+	+	+	-
H. persicus	+	+	-	+
H. t. triedrus	-	+	-	-
H. t. turcicus	+	+	-	-
Ptyodactylus homolepis	-	+	-	-
Stenodactylus lumsdenii	+	-	-	-
S. maynardi	+	-	-	-
S. orientalis	+	+	-	-
Teratolepis fasciata	-	+	-	-
Teratoscincus microlepis	+	-	-	-
T. scincus	+	-	-	-
Tropiocolotes depressus	+	-	-	-
T. helenae	+	+	-	-
T. p. persicus	+	-	-	-

Taxon	Baluchistan	Sindh	Punjab	N.W.F.P
T. p. euphorbiacola	+	-	-	-
Pristurus rupestris	+	+	-	-
Agamidae				
Agama agalis isolepis	+	+	+	-
A. agrorensis	-	-	+	+
A.c. caucasica	-	-	-	-
A. h. himalayana	-	-	-	+
A. megalonyx	+	+	-	-
A. m. melanura	+	+	+	+
A. m. lirata	+	-	-	-
A. n. nupta	+	-	-	-
A. n. fusca	+	-	-	-
A. rubrigularis	+	+	-	-
A. ruderata blauchiana	+	+	-	-
A. tuberculata	-	-	+	+
A. minor	-	+	+	-
Calotes versicolor	+	+	-	-
Phrynocephalus clarkorum	+	-	-	-
P. euptilopus	+	-	-	-
P. luteoguttatus	+	-	-	-
P. m. maculatus	+	+	-	-
P. ornatus	+	-	-	-
P. scutellatus	+	-	-	-
Sitana ponticeriana	-	+	-	-
Uromastyx asmussi	+	-	-	-
U. hardwickii	+	+	+	+
Chamaeleonidae				
Chamaeleo zeylanicus	-	+	-	-
Lacertidae				
Acanthodactylus c. cantoris	+	+	+	-
A. c. blanfordi	+	-	-	+
A. micropholis	+	-	-	-

Taxon	Baluchistan	Sindh	Punjab	N.W.F.P
Eremias acutirostris	+	-	-	-
E. aporosceles	+	-	-	-
E. brevirostris	+	-	+	-
E. fasciata	+	-	-	+
E. guttulata watsonana	+	+	+	-
E. scripta	+	-	-	-
E. velox persica	+	-	-	+
Ophisops e. elegans	-	-	+	-
O. jerdonii	+	+	+	+
Scincidae				
Ablepharus pannonicus grayanus	+	+	-	-
A. p. pannonicus	+	+	+	+
Chalcides o. ocellata	+	+	-	-
Eumeces schneiderii blythianus	+	+	-	+
E.S. zarudnyi	+	-	-	-
E. taeniolatus	-	+	+	+
Leiolopisma himalayana	-	-	-	+
L. ladacensis	-	-	-	+
Mabuya dissimilis	+	+	+	+
M. macularia	+	+	-	-
M. aurata	-	+	-	-
Ophiomorus blanfordi	+	-	-	-
O. brevipes	+	-	-	-
O. raithmai	-	+	-	-
Riopa punctata	-	+	+	+
Varanidae				
Varanus b. bengalensis	+	+	+	+
V. flavescens	-	+	+	-
V. griseus caspius	+	-	-	-
V. g. koniecznyi	-	+	+	-

Note:+ indicates presence, - indicate absence

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RARE FIND

MADRAS (CEE-NFS): A species of skink till now believed to be found only in Sri Lanka has been discovered in the Mundanthurai Wildlife Sanctuary in Tamil Nadu. Skinks are lizard-like reptiles with a heavy tail and limbs that are reduced or missing.

Identified as Dasia haliana and described as tree-dwellers, the skink found in the Mundanthurai Sanctuary is strikingly different in colour and pattern from species so far known in India.

The discovery, made by Mr. Justus Joshua and Mr. A.G. Sekar while looking for lower invertebrates in the sanctuary, has been reported in the Journal of the Bombay Natural History Society. Since the first sighting, the species has been spotted in the southern-most part of the Western Ghats of Tamil Nadu also.

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A NOTE ON A TAIL ABNORMALITY OF THE SPOTTED HOUSE GECKO (*Hemidactylus brooki*)

On January 25, 1983, a common wall lizard, *Hemidactylus brooki* was noticed with a bifurcated tail at Kakdwip (Sunderbans), West Bengal. The specimen was active and was collected while devouring insect prey attracted to light. It measured 90 mm in total length, the tail 42 mm. The tail was bifurcated at about the middle.

A perusal of literature reveals that Chandra and Mukherjee (1980) reported the occurrence of bifurcated tail in the agamid lizard, *Agama tuberculata* from Simla hills, Himachal Pradesh. However, as far/the authors are aware, /as this is the first report of a tail abnormality in the Spotted House Gecko.

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Chandra, M and R. Mukherjee, 1980. On the occurrence of bifurcated tail in Agama lizard from Simla hills, Himachal Pradesh. J. Bombay Natural History Soc. 77(2):343.

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THE ROLE OF REPTILES IN CONTROLLING FOOD PESTS

Abstract

While we debate whether it is insects or rodents that cause more damage to human crops, multinational pesticides dealers reap ever higher profits selling death and we have largely ignored natural factors working for us. The rodent-eating habit of reptiles merits considerable attention and further study. Although the laws protecting certain reptiles species are based on this argument there is little quantified data particularly for the Indian region.

This paper reviews the available information on the reptile-rodent (and other crop pest) relationship and reports new data based on captive feeding studies and the analyses of wild reptile scats (fecal matter) and stomach contents. In peninsular India at least twelve species of common snakes and the four species of monitor lizards are important predators on rodent and other food pests.

It is concluded that reptiles, especially several snake species, are valuable components in an integrated approach to the control of food pests including rodents, insects and crabs which constitute a large proportion of their diet. It is recommended that the appropriate agencies of the Government of India initiate and support field studies on bio-control of food pests with particular reference to the reptiles.

Introduction

Of the larger reptiles a majority, including the crocodiles and the monitor lizards, such snakes as the cobra, rat snake and python, eat rodents. Although this is common knowledge, there has been little in-depth study of this topic and quantified data are hard to find; a summary of available facts for India and a few comparative examples from nearby regions follows.

Monitor lizards (Varanidae)

Deraniyagala (1939) pointed out the value of the water monitor (*Varanus salvator*) in Sri Lanka as it feeds on the large freshwater crabs which are so destructive to rice field dams as well as coconut weevils and their larva. H.C. Smith (1940) reported that in Burma although monitors are known to be destructive to poultry "the damage done in this way is believed to be more than counteracted by the amount of good these reptiles do by devouring large numbers of rats and mice which would otherwise destroy field crops". Further afield from India, Dryden (1965) mentioned that the decline of the monitor in Micronesia (*Varanus indicus*) caused by the introduction of the poisonous cane toad (*Bufo marinus*) on which it feeds has resulted in a drastic increase in rodents. He found /30% of 54 monitor stomachs /that examined contained rodent remains. The same result was reported in a study of 47 Australian monitors, *Varanus gouldii* (King and Green, 1979). Whitaker and Hikida (1981)

gave details of scat analysis of monitor lizards in an area near Madras; 60% of the samples from farmland contained rodent remains as did 30% of those from nearby scrub jungle.

Two divisional Forest Officers in Bangladesh translocated monitors to rodent-infested plantations of Acacia sinagal in Barisal District. Although data were not quantified, they reported successful plantations of several years old saplings where previously nearly 100% of the seedlings were being pest-destroyed (Whitaker and Hikida, 1981).

Table 1 shows the results of analysis of stomach contents and scats of two indigenous monitor species from three localities. A major portion of the total gut contents were insects, largely Orthoptera and Coleoptera including known crop pests.

Table 1

Non-rodent prey remains in stomachs and scats of monitor lizards

Percent of total (number) Data from Whitaker & Hikida, 1981.

Varanus Species	Locality	Dates	Number examined	Crabs	Insects	Snails
bengalensis	Madras/ India	May/	22	18(4)	72(16)	(18(4)
bengalensis	Bangla-desh	June/ July	30	23(7)	67(20)	(13(4)
flavescens	Bangla-desh	June/ July	15	20(3)	40(6)	Nil

Monitors in June/July had fed mainly on invertebrates such as crabs, millipedes, snails, beetles and their larvae. The diet of these opportunistic predators, equipped to deal with large as well as small prey, is evidently determined by the seasonal abundance of different prey species. Monitors may specialize on rodents during the post monsoon harvest season when prey such as insects, frogs and crabs become less abundant. That monitors can deal with rodents as prey has been well established. Loop (1974) demonstrated the ability of the common Indian monitor (Varanus bengalensis) to swallow fairly large rodent prey very quickly. For example, a mouse of 50-60% of the lizard's head diameter is ingested in about 40 seconds.

Snakes

At leest twelve common Indian snakes are reputed to feed predominantly on rodents, but there are few data. Table 2 gives average feeding rates for these twelve species of snakes maintained at the Madras Snake Park, demonstrating their rodent destroying potential. To test these findings, scats were collected from wild venomous snakes and analyzed. The results are summarized in Table 3; it is significant that in two of the four species over 70% of the scats examined contained rodent remains.

Whitaker and Advani (1983) reported on various aspects of the snake-rodent relationship including ecological and size factors which are important determinants of preferential predation by snakes on different rodent species. Table 2 also shows feeding preferences of captive reptiles deduced by experimental feeding over a ten year period at the Madras Snake Park. Table 4 provides a preliminary indication of rodent prey preferences of four species of common venomous snakes in the wild. In the case of the cobra which commonly lives adjacent to damp rice fields, the rodent it is most likely to find, the lesser mole rat, (Bandicota bengalensis) is the species it mainly prey upon. Chakraborthy (1975) reported the occurrence of lesser bandicoot rats B. bengalensis) in farmland in West Bengal as being 108-700 per hactare in different months between November and June. There were usually about 50 live burrow systems with an average of 5-10 rats per burrow. As the main prey of the cobra in Tamil Nadu (see Table 4) it is likely the cobra (two sub-species of which are common in W. Bengal) is an important predator on the lesser bandicoot in West Bengal as well.

The Russells viper, which prefers scrub jungle and dense hedgerows, feeds mainly on the common rodent of that drier habitat, the gerbil (Tatera indica). Both the krait (a thin snake) and saw-scaled viper (a small snake) eat more mice (Mus spp.) than other rodents, reflecting the importance of size of prey rather than habitat. Several other species of medium sized rodents also share these latter two snakes' respective habitats, but are seldom preyed on. Further study could also determine the seasonality of differential prey usage by snakes and the survival advantages of avoiding larger species of snakes (a number of which are cannibalistic) while hunting for prey. Arnold (1972) demonstrated that the variance in numbers of sympatric snake species is related to the density of prey species. He contended that "where there are more species of prey, more species of predators can co-exist because there are more ways to avoid competition for food".

Lim (1974) studied the feeding habits of 5 species of snakes (mainly Naja sp. and Ptyas sp.) in a Malaysian oil palm estate. A one year feeding trial was undertaken in a study area with an estimated 100-200 rats per acre. It was concluded that these natural predators keep the rat population down but the data have not been seen by this author.

Both in Singapore and Bangkok it was common in the recent past for reticulated pythons to be placed in grain storage godowns to control rats (snakes are good deterrents to human thieves as well). An interesting, controlled experiment using released harmless snakes could be made on uninhabited islands in Lakshadweep where rats destroy large amounts of the coconut crop. This is not as revolutionary an idea as it sounds. In one rat control programme in Lakshadweep the cost in man hours and poisons amounted to Rs.14/- per rat (Whitaker and Bhaskar, 1978). With the right public relations approach, the coconut harvesters and fishermen who visit the islands after the monsoon would quickly appreciate hard cash value of harmless snakes.

While it is difficult to expect farmers to encourage venomous snakes near their homes, it is just as misguided to encourage the slaughter of any snake species in the field where they normally dwell. Even considering prevailing high rodent densities, ten snakes of the size of the cobra or rat snake (Ptyas mucosus) on a hectare of land would provide significant control of rodent numbers, consuming about 160 rodents per month. Further, the presence and activity of reptiles in farmland is just as important as actual consumption of rodents by the reptiles. For example, Whitaker and Advani (1983) report how diurnal snakes such as the rat snake enter burrows of Tatera indica (and other rodents). Even if they don't capture any of the occupants, the rats are forced to vacate by the the escape hole making them highly susceptible to other predators.

Village interviews - Chingleput District

During the current harvest season (January/February 1984) a preliminary survey was made in eleven villages south of Madras to ascertain what the rice farmers feel are the main crop pests and the value of reptiles. Groups of farmers were interviewed in each village and the concensus of opinion was recorded. Most of the approximately 150 "interviewees" were men above 40 years of age.

Question 1. What is the No.1 crop pest?

Unanimously rats are the main pest, mainly the lesser mole rat (Bandicota bengalensis) and the gerbil (Tatera indica). Insects were indicated as a close second in several villages.

Question 2. When is the damage greatest?

December and January (pre-harvest and harvest stage) are the months of greatest crop damage from rats and October/November (seedling and transplant stage) of greatest damage from insects.

Question 3. Are crabs pests?

Yes, their tunnels undermine and destroy bunds in rice fields and they eat stems of seedlings.

Question 4. What are the main insect pests?

Caterpillars, black beetles, large worms (beetle larva); grasshoppers and termites in that approximate order.

Question 5. Are snakes killed?

Snakes generally killed on sight.

Question 6. Are snakes and monitor lizards helpful by eating rodents, crabs and insects?

In six of the eleven villages interviewees acknowledged that they knew of the usefulness of snakes and particularly monitors in destroying crop pests.

* * * *

The main crop pests mentioned by the rice farmers are the lesser mole rat and the gerbil, insects (Coleoptera, Lepidoptera, Orthoptera, Isoptera) and field crabs. The data in Table 4 shows that the two main rodent pests are main food items of the cobra and Russells viper. The insects and crabs described by the interviewees correspond to findings of main prey items in stomachs and scats of monitor lizards (Table 1), all of which further strengthens the case in favour of reptiles as pest controllers and incidentally points to the need for public education in this important area.

Discussion

General statements on predator/prey relationships abound in the literature. Howard and Marsh (1975) maintain that "predators usually do not keep detrimental rodents below pest densities". They concede that house cats can keep a rodent population from increasing but are explicit that poison is usually cheaper! Similar statements not based on actual findings with reptiles, rephrase the oft repeated maxim that abundance of prey is what determines predator numbers and therefore natural predation cannot keep prey species like rodents below what we call "pest level". Predator species diversity and the role of reptile predators in dislodging rodents

from their burrows (which, particularly during daytime must dramatically increase rodent mortality) are two important factors rarely, if ever, considered.

Rapport (1971) describes a model for analysis of food selection behaviour by predators. Given predator preferences and prey availability, the model determines the numbers and types of prey species consumed. So far we have no accurate quantitative data on reptile population density in India though the rodent prey species have been studied in depth (see for example Prakash, 1976). Fall (1977) comments on the lack of critical experiments to evaluate the real potential of biological control and natural predation. It is hoped that this paper will help provide the impetus to initiate such studies in India. Already a very enlightened conservation stance has been taken by the Government of India in banning the formerly uncontrolled slaughter of snakes and monitor lizards for skins. It is time we support theory with solid data.

A reason that is here stressed to justify the unreserved pursuit of biological pest control is the danger from pesticides. Rats in Europe and the U.S.A. are now building up resistance to warfarin; secondary poisoning studies to date leave any scrupulous scientist unconvinced; standards and measurements of "success" of pesticide programmes are vague and inconsistent; the industry is big multinational in scope and uses valuable foreign exchange. The use of such toxic chemicals, readily available to any untrained person, cannot be condoned without first examining the options.

Table 2 Feeding rates of captive reptiles on rodents

Reptile

No.	Common Name	Scientific Name	Number	Average length	Average number of rodents eaten per month
1.	Red sand boa	Eryx johnii	4	50cm	8 rats[a]
2.	Common sand boa	Eryx conicus	4	50cm	9 rats[a]
3.	Indian python	Python molurus (juvenile)	7	1m	10 rats[b]
4.	Trinket snake	Elaphe helena	4	1m	17 mice & small rats[c]
5.	Banded racer	Argyrogena fasciolatus	4	1m	12 mice & small rats[c]
6.	Rat snake	Ptyas mucosus	12	1.75m	16 rats[a]
7.	Cobra	Naja naja	10	1.2m	8 rats[a]
8.	Common krait	Bungarus caeruleus	10	1m	13 mice & small rats[c]
9.	Saw-scaled viper	Echis carinatus	12	30cm	20 mice[d]
10.	Russells viper	Vipera russellii	10	1m	6 rats[a]
11.	Green pit viper	Trimeresurus gramineus	2	50cm	7 mice[d]

(24)

No.	Common Name	Scientific Name	Number	Average length	Average number of rodents eaten per month
12.	Andaman pit viper	Trimeresurus purpureo-maculatus andersoni	2	65cm	6 mice[d]
13.	Yellow monitor lizard	Varanus flavescens	2	85cm	9 rats[e]
14.	Water monitor lizard	Varanus salvator	3	1.5m	32 rats[a]
15.	Mugger crocodile	Crocodylus palustris	12	2.5m	35 rats[f]

Data courtesy, Madras Snake Park Trust

Rodents usually provided to the captive reptiles:

a Rattus meltada, Bandicota bengalensis

b Rattus meltada, Bandicota bengalensis, Bandicota indica

c Mus spp. R. meltada

d Mus spp.

e R. meltada

f B. indica

Table 3 Scat contents of wild snakes in Chingleput District Tamil Nadu (October - January)

(Expressed in percentage of total with number of occurrences in brackets)

	Cobra (*Naja naja*)	Krait (*Bungarus caeruleus*)	Russell's Viper (*Vipera russellii*)	Saw-scaled Viper (*Echis carinatus*)
Number of scats	53	69	24	160
Birds	-	1(1)	-	-
Reptiles	4(2)	43(30)	4(1)	-
Amphibians*	8(4)	3(2)	8(2)	80(120)
Rodents	85(45)	29(20)	71(17)	22(33)
(Rodent Species)				
Tatera indica	17(9)	4(3)	46(11)	3(5)
Bandicota bengalensis	60(32)	16(11)	27(6)	-
Rattus meltada	8(4)	3(2)	-	-
Mus bodoga	-	6(4)	-	19(28)

*Small insect remains are presumed to be from stomachs of ingested frogs and toads

Data courtesy Irula Snake Catchers Cooperative, Madras.

Table 4 Common rodent-eating reptiles of India (Whitaker and Advani 1983)

Reptile

Common name	Scientific name	Likely rodent prey preferences
Common monitor	Varanus bengalensis	All rodents
Yellow monitor	Varanus flavescens	Smaller species
Water monitor	Varanus salvator	All rodents
Desert monitor	Varanus grizeus	Smaller species
Indian python	Python molurus	All larger species such as Tatera, Bandicota etc.
Common sand boa	Eryx conicus	Small to medium burrowers
Red sand boa	Eryx johnii	Mus, Rattus meltada
Trinket snake	Elaphe helena	Arboreal species such as tree rat and Funambulus
Rat snake	Ptyas mucosus	All species including Bandicota
Banded racer	Argyrogena fasciolatus	Small taxa such as Mus
Common krait	Bungarus caeruleus	Mus and Rattus meltada, young of larger taxa
Banded krait	Bungarus fasciatus	Same as common krait
Cobra	Naja naja naja	Tatera, Bandicota bengalensus, Rattus melada, Mus
Russells viper	Vipera russellii	Tatera indica
Saw-scaled viper	Echis carinatus	Mus spp.
Pir vipers	Trimeresurus spp.	Arboreal species

Table 5 Scat contents of wild mugger (Crocodylus palustris) in Tamil Nadu

Number of scats: 30

Place: Chidambaram (Tamil Nadu)

Date: May, 1974

Contents: (hair, bones, teeth etc.)

Species	No. of occurrences	Percentage
Mole rat (Bandicota bengalensis)	30	100
Gerbil (Tatera indica)	3	10
Bird	3	10
Snake (Xenochropis, Amphiesma)	3	10
Fish scales	3	10

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R. Whitaker and Shekar Dattatri

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SAVING THE ANDAMANS AND NICOBARS

Many of you know the role public opinion played in getting action to save the Ridleys sea turtles from heavy exploitation on the Orissa and West Bengal coasts. Even more dramatic were the forces mobilized to get the Silent Valley hydel project scrapped (and an important rain forest saved). The power of the people shouldn't be underestimated. We are now faced with the spectre of one of the world's finest and most pristine island archipelagos being squandered for short term gains.

All we are asking is that the high powers of India examine the various development options for the islands before allowing any massive projects which may destroy the island ecosystem.

Besides 20 endemic herps like the Andaman Day Gecko and Andaman krait, important Leatherback Turtle beaches, there are endemic birds like the Narcondam Hornbill and Nicobar Megapode and mammals like the Andaman Civet. There are islands which attract thousands of Amphibi Sea Snakes to lay their eggs, an island of Andaman Teal and another where saltwater crocodiles regularly nest. But perhaps the most tragic result of the continuing deforestation, settlement and monoculture plantations is the demise of three of the five indigenous tribes. Do what you can to help. Send your own letter to the Prime Minister of India or send the enclosed xeroxed letter. Do it now.

EXPLOITATION OF REPTILES & AMPHIBIANS IN THE SUNDERBANS, WEST BENGAL

Recently I visited two large colonies of snake, frog, and turtle catchers at Mahamaya and Bamanerchar villages in the Sunderbans. About 400 Hindu and Christian families are engaged in this profession. Snakes are caught by hand and the most commonly caught are the rat snake (Ptyas mucosus) and checkered keelback (Natrix piscator). They sell the semi-tanned skin to the local dealers (commonly known as 'Fare'). The current prices of average sized rat snake and checkered keelback skins are Rs.18/- and Rs.15/- respectively.

Monitor lizard skin were also tanned by them about 4 to 5 years ago but according to them monitors are hard to get.

The most commonly caught frog is/Indian bullfrog the (Rana tigerina). The killing and sorting is done at home after which the 'Fare' buys the frog legs for Rs.9.50 per kg. (large sized) or Rs.6.50 per kg. (small sized). The catchers use lamps, 3 celled torches, sticks and nets to catch the frogs.

The commonly caught turtle is/Indian spotted flap shelled the turtle (Lissemys punctata). To catch turtles they use what is known as 'jegul khonch', a large bamboo stick tipped at one end with an iron point to search for turtles in the pond or mud. They sell the turtles in the local markets as food where the current price of Lissemys is Rs.16/- per kg.

The snakes, frogs and turtles are caught by these catchers from the villages, forested areas, ponds and canals of the Sunderbans. It is noted that the snake catchers of these two villages never go in for snake charming nor do they practice folk medicine for snakebite patients.

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SOMETIMES FALLACIES HELP TO CONSERVE SNAKES

There are many fallacies concerning snakes in Bengal but some traditional beliefs have an active role in conserving snakes. For example in Bengal the rat snake (Ptyas mucosus), Indian cobra (Naja kaouthia & Naja naja) are believed to be the "Bastu Samp" (i.e. the snake of the ancestral homestead). The villagers believe that they reside in the homestead as guardians. According to them killing "Bastu samp" is a crime and generally do not kill these snakes or drive them away from their homes.

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A COMMON KRAIT BITE WITH NO ENVENOMATION

Smt. Mangala Giri, aged about 28 years, W/o Monimohan Giri of village Purbagurguria, P.S. Kultadi, Dist.24 Parganas, West Bengal was bitten by a common krait (Bungarus caeruleus) on the right hand on 3.9.84 at about 5 A.M while she was asleep on the floor. The snake was seen and killed. It was 90 cm long and was brought with the patient. She was admitted in this hospital on 3.9.84 at 10-15 A.M. Her home was about 35/40 kms away from this clinic in the riverine area of Sunderbans. She was treated at home by a local quack who applied a tight ligature on the arm. The part below the ligature was heavily swollen and the patient was tossing about due to the ligature. I was asked by my colleague to see her. On examination I found that the patient developed no signs and symptoms of envenomation, though two distinct fangs marks were present on the dorsum of the hand. Ligature was removed at once. Beyond assuring her and giving her s tetanus injection and some placebos nothing was done. The patient was discharged from the hospital on 4.9.84 as she developed no complication due to the bite or ligature.

Though the common krait is dangerously poisonous, a sub-lethal dose of venom (or no venom) was injected into the body of the victim. So, she developed no signs and symptoms of snake venom poisoning. (see Hamadryad 9: No.2, May 1984)

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Editor's Note: Snakes inject venom voluntarily and "dry bites" are a common phenomenon in venomous snakes in general and are obviously the main reasons for the fact that most snakebites are not fatal in humans.

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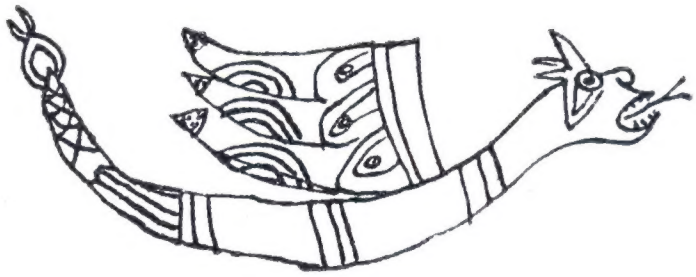

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